L119 801 0003
CHEMETCO
ILD 048 843 809
Superfund/HRS
Sept 2002

CERCLA

Expanded Site Inspection

Illinois Environmental
Protection Agency

TABLE OF CONTENTS

9/12/02

APPENDICES

FIGURES (in Appendix A)

TABLES (in Appendix B)

1. INTRODUCTION

The Illinois Environmental Protection Agency's (Illinois EPA) Office of Site Evaluation was tasked by the United States Environmental Protection Agency (USEPA) to conduct a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Expanded Site Inspection at Chemetco located near Hartford, Illinois. This investigation was conducted to help determine the levels of contamination present at the Chemetco facility as well as receptors which could potentially be impacted by activities at the site. These potential receptors include Long Lake, residential yards and residential wells.

In April of 2002, the Illinois EPA's Office of Site Evaluation prepared and submitted a work plan for the Chemetco site to the Region V offices of the USEPA. The sampling portion of the Expanded Site Inspection was conducted on the week of April 15, 2002 when the Illinois EPA sampling team collected fourteen soil and slag samples from the Chemetco property, seven residential soil samples, ten sediment samples from Long Lake and four residential groundwater well samples.

Chemetco had been placed on CERCLIS in 1980 and had an initial assessment and inspection conducted in 1987. At that time the site was given a "no further action" referral since the site was regulated under Resource Conservation Recovery Act (RCRA) regulations. In 2002 it was determined that the site should be reassessed under CERCLA since RCRA regulations would not cover the entire scope of the potential environmental problems at the site.

2. SITE BACKGROUND

2.1 SITE DESCRIPTION AND HISTORY

The Chemetco facility is located within a primarily agricultural, light residential area south of Hartford, Illinois at the intersection of Illinois Route 3 and Oldenberg Road. Chemetco operations were conducted on an approximately 40-acre parcel of land surrounded by a chain link fence, which restricts access to this portion of the property. Chemetco owns an additional 230 acres of land surrounding the facility. The Chemetco facility is located in the former floodplain of the Mississippi River in an area referred to as the American Bottoms. The Mississippi River levee system in the area prevents the site from being flooded by the Mississippi River now. The site is in the Southeast ¼, Section 16, Township 4 North, Range 9 West of the Third Principal Meridian, in Madison County. See Figure1 and Figure 2 for the location of the site and Figure 3 for a Chemetco facility map.

The Chemetco facility was constructed in 1969 and initiated operations as a copper smelter in 1970 to derive copper and other non-ferrous metals and alloys from recyclable copper-bearing scrap and manufacturing residues. The Chemetco facility produced anode copper, cathode copper and crude lead-tin solder and zinc oxide. They utilized four furnaces to melt scrap metal and other wastes and then extract copper and other saleable byproducts. A product resulting from this process was an iron/silicate slag. The facility generated three other primary solid waste streams, which are zinc oxide, baghouse dust, and spent refractory brick.

Waste slag at the Chemetço facility was generated from both water-cooled and air-cooled processes. The water-cooled slag was crushed, dried and screened for correct particle size and then sold as a material to use as roofing shingle backing. Because of this use, the water-cooled slag did not accumulate on the site.

The air-cooled slag, on the other hand, was stored on-site in large slag piles, which remain at the site today. These are located mainly on the eastern portion of the facility property and cover approximately thirteen acres. It is estimated that approximately 1,000,000 tons (or 300,000 cubic yards) of this slag currently exists on the property. This slag contains elevated levels of lead and copper and fails TCLP hazardous waste tests for lead. Currently, the U.S. Bankruptcy Court is working with the Illinois EPA to determine whether this slag can be sold and used for any beneficial purposes.

In 1986, Chemetco installed a ten-inch discharge pipe which illegally discharged plant storm water into an area which entered a tributary of Long Lake, located just south of the facility. This discharge contained oils and greases, metals and zinc oxide slurry which contained elevated levels of several metals. This illegal discharge area (entitled "zinc oxide spill") was discovered by the Illinois EPA during a routine RCRA inspection on September 18, 1996. When the discharge was discovered, Chemetco was required to conduct remediation of the areas impacted by the zinc oxide discharge. This cleanup is discussed in great detail in the report entitled "Zinc Oxide Spill Remediation Plan" which can be found in the Illinois EPA Bureau of Land files under the identification number L1198010003. No cleanup of sediments was conducted downstream in Long Lake during these remediation activities.

On October 31, 2001, the facility was shut down and filed for bankruptcy. At that time, the U.S. Bankruptcy Court for the Southern District of Illinois an its appointed Trustee took over the property. The property is currently abandoned with the exception for a small work crew which is being used to conduct operations to sell portions of the remaining products that are left at the site. Overseeing this work is Ron Yarbrough, PhD. and professional geologist, who is acting as the on-site environmental manager. Dr. Yarbrough was appointed to this position by the Court Trustee, Ms. Laura Grandy.

3. EXPANDED SITE INSPECTION ACTIVITIES AND ANALYTICAL RESULTS

3.1 INTRODUCTION

This section outlines the procedures utilized and observations made during the CERCLA Expanded Site Inspection conducted at Chemetco. Specific portions of this section contain information pertaining to the reconnaissance inspection, site representative interviews, and field sampling procedures. Also included in this section is information about the soil, sediment, groundwater and waste samples that were collected and a description of the analytical results.

3.2 RECONNAISSANCE INSPECTION

In March of 2002, Mr. Peter Sorensen of the Illinois EPA's Office of Site Evaluation conducted a reconnaissance inspection at Chemetco. The site reconnaissance included a visual inspection of the site to become familiar with the property, to identify potential sampling locations, and to survey the surrounding land uses.

The reconnaissance revealed that the Chemetco property is an inactive industrial facility that is located on approximately forty acres of land. Chemetco owns an additional 230 acres of property outside of the facility fences. Chemetco is approximately two miles south of the City of Hartford with sparcely populated agricultural land surrounding the site. Illinois State Route 3 is located just west of the facility along with a new State of Illinois Lewis and Clark Historic Center. A tributary to Long Lake is located just to the south. The portions of the facility that are not covered by buildings or slag piles are almost entirely covered with either concrete or compacted slag material.

3.3 CONVERSATIONS WITH SITE REPRESENTATIVES

Mr. Peter Sorensen of the Illinois EPA's Office of Site Evaluation held conversations with Dr. Ron Yarbrough who represented the Bankruptcy Court Trustee. During these conversations, the upcoming sampling event at Chemetco was discussed and the CERCLA Expanded Site Inspection process and the specifics concerning the sampling activities of the upcoming sampling event were explained.

3.4 SEDIMENT SAMPLING

Ten sediment samples were collected from a tributary to Long Lake and Long Lake in April of 2002 to help determine whether contaminants have migrated from Chemetco into the lake. These samples were analyzed for the inorganics portion of the Target Compound List (see Appendix C) using hand augers. All sediment samples were collected from the top six inches of sediment. The locations of the sediment samples can be seen on 4 and the complete analytical results can be seen in Table 2.

3.5 SOIL SAMPLING

Seven soil samples were collected from six residential yards on property located in the vicinity of Chemetco. These samples were collected to help determine whether contamination from Chemetco has migrated to residential yards and could pose a hazard to the residents. These samples were analyzed for the inorganics portion of the Target Compound List (see Appendix C) and collected with hand trowels. All soil samples were collected within the top inch of soil. The locations of the soil samples can be seen on Figure 4 and the complete analytical results can be seen in Table 3.

3.6 GROUNDWATER SAMPLING

Five residential groundwater samples were collected from four private wells on properties located in the vicinity of Chemetco. These samples were collected to help determine whether contamination from Chemetco has impacted the local groundwater and could pose a hazard to the residents who utilize this water. These samples were analyzed for the entire Target Compound List (see Appendix C). All groundwater samples were collected directly from taps at the residences prior to going through any types of water treatment processes. The locations of the residential groundwater samples can be seen on Figure 4 and the complete analytical results can be seen in Table 4.

3.7 ON SITE SAMPLING

Fourteen samples were collected from various types of materials located on the Chemetco property. Six samples were collected from the large slag pile, two samples were collected from the zinc oxide pile, one sample was collected from a pile located in the former foundry building, three samples were collected from the truck parking lot (made of slag) and two samples were collected from an open area of land just south of the main facility property. These samples were collected to help determine the levels of contamination that exist on the Chemetco property and could potentially migrate to environmental receptors. These samples were analyzed for the inorganics portion of the Target Compound List (see Appendix C) and collected with hand trowels. The locations of the soil and slag samples can be seen on Figure 3 and the complete analytical results can be seen in Table 1.

4. IDENTIFICATION OF SOURCES

4.1 INTRODUCTION

This section will briefly discuss the hazardous waste sources which have been identified through CERCLA site investigation process. Two waste piles and a spill have been initially identified.

4.2 SLAG PILE

A waste product resulting from the secondary smelting processes that took place at Chemetco is slag material. While in operation, Chemetco sold their water-cooled slag but piled their air-cooled slag material on site, mainly in the eastern portion of the property (see Figure 3). Over the years, these piles grew to a large size and now cover an estimated area of approximately thirteen acres. There is no cap or liner to help prevent the contaminants from being spread off site via the air, groundwater or surface water pathways.

Six samples were collected from these slag piles (X501 – X504, X508 and X509). The analytical results from these samples were found to contain significantly elevated levels of copper and lead. Table 1 shows the concentrations of these contaminants that were detected in the slag on site and Figure 3 shows the locations of these samples.

As mentioned earlier, the Bankruptcy Court Trustee is currently in the process of determining whether the slag can be safely sold and utilized by other companies which are interested in purchasing the material.

It should be noted that the truck parking lot located just south of the main facility property is also composed of slag material. The parking lot was built in 1980 and currently occupies approximately 3.3 acres of land just north of and adjacent to the tributary to Long Lake. Three samples (X513, X514 and X515) were collected from this area and also were found to contain significantly elevated levels of copper and lead. As with the slag pile, there is no cap or liner to help prevent the contaminants from being spread off site via the air, groundwater or surface water pathways.

4.3 ZINC OXIDE PILE

Zinc oxide is a particulate matter which was collected from the foundry furnaces exhaust gases. A bunker approximately 2.7 acres in size and storing approximately 35,000 tons of zinc oxide is located on the northern portion of the facility (see Figure 3). Two samples were collected from this area (X505 and X506) and were also found to contain high levels of copper, cadmium and lead. There is no cap or liner to help prevent the contaminants from being spread off site via the air, groundwater or surface water pathways. Table 1 shows the concentrations of these contaminants that were detected in the slag on site and Figure 3 shows the locations of these samples.

As with the slag material, the Bankruptcy Court Trustee is currently in the process of determining whether the zinc oxide can be safely sold and utilized by other companies which are interested in purchasing the material.

4.4 ZINC OXIDE SPILL

In 1986, Chemetco installed a ten-inch discharge pipe which illegally discharged plant storm water into an area which entered a tributary of Long Lake, located just south of the facility. This discharge would have contained oils and greases, metals and zinc oxide slurry which contained elevated levels of several metals. This illegal discharge area was discovered by the Illinois EPA during a routine RCRA inspection on September 18, 1996. When this was discovered, Chemetco was required to conduct remediation of the areas impacted by the zinc oxide discharge. This cleanup is discussed in great detail in the report entitled "Zinc Oxide Spill Remediation Plan" which can be found in the Illinois EPA Bureau of Land files under the identification number L1198010003. No cleanup of sediments was conducted downstream in Long Lake during these remediation activities.

5. MIGRATION PATHWAYS

5.1 INTRODUCTION

CERCLA identifies three migration pathways and one exposure pathway by which hazardous substances may pose a threat to human health and/or the environment. Consequently, sites are evaluated on their known or potential impact to these four pathways. The pathways evaluated are groundwater migration, surface water migration, air migration and soil exposure. The following section discusses these pathways and the site's impact or potential impact on them and on the various human and environmental targets. These targets include human populations, fisheries, endangered species, wetlands and other sensitive environments.

5.2 GROUNDWATER PATHWAY

The local geology and hydrology have been studied extensively for Chemetco by environmental consultants. Their data has been reviewed and summarized by Gina Search, a geologist for the Illinois EPA's Collinsville Regional Office. Rather than attempting to explain Ms. Search's summary of the geologic and hydrologic information, it will be provided on the following to pages.

Site Geology and Hydrogeology

The information in this section is drawn from studies prepared by CSD for Chemetco and submitted to the Agency.

Site Geology
The facility is located about one mile east of the confluence of the Missouri and Mississippi Rivers in a flood plain area locally known as the American Bottoms. The American Bottoms topography is relatively flat and includes 175 square miles of Mississippi River floodplain, which is approximately 30 miles long and ranges from about 3 to a maximum of 11 miles wide.

The American Bottoms is an area underlain by Pleistocene-age, unconsolidated valley fill deposits that range from 12 to 170 feet thick and average 120 feet in thickness. Generally the grain size sediments coarsens in the valley fill. A generalized cross section submitted by Chemetco depicts the area as underlain by top soil and slag fill which ranges in thickness from 0 to 11 feet. This is underlain by clay and silt with interbedded lenses of sand and silt. The interbedded sands and silts are predominant in the southeast corner of the site. The sand lense does not extend to the northern and western boundaries of the facility. A second sand lense has been identified to the east of monitoring well 12. These deposits range in thickness from 15 to 55 feet thick. Underlying the clay and silt is a sand layer containing some gravel and silt which ranges from 12 to 75 feet in thickness. A 50 foot sand and gravel layer underlies the finer sand unit. This is underlain by limestone bedrock.

Site Hydrogeology

The principal water-bearing units beneath Chemetco are a Perched Shallow Aquifer, the Upper Regional Aquifer and the Lower Regional Aquifer. These zones are monitored by Chemetco and have been classified as Class I groundwater.

Upper and Lower Regional Aquifer
The fine sand layer and the underlying coarse sand and gravel layer comprise the regional American Bottoms aquifer. There is no boundary between these formations in the regional aquifer, but they are two distinct geologic units. The fine sand layer (upper regional) and coarse sand and gravel layer (lower regional) are one hydrostratigraphic unit and they have direct hydraulic connection with each other. Each zone has similar level elevations under static groundwater conditions indicating significant hydraulic connection between the two systems. The regional aquifer is generally greater than 90 feet thick and extends to bedrock. Local groundwater use in the area includes Chemetco's industrial use only well and 10 private wells located within one mile of the facility. The aquifer is a source of municipal, industrial and agricultural water within the area. The limestone bedrock aquifer below the American Bottoms aquifer is highly mineralized and has not been used for groundwater supplies. Chemetco submitted flow maps for the first and second quarter sampling rounds in 2001.

The facility proposes that flow direction in the upper regional aquifer is influenced by the onsite water production wells. A review of these documents does not indicate that flow beneath the facility is controlled by their pumping activities. Groundwater flow direction in the lower regional aquifer was from the northeast to the southwest during the first quarter and from the west to the east during the second quarter. The upper and lower aquifer flow maps appear to coincide during these first two quarters of sampling.

Hydraulic Conductivity Tests

Pump tests and slug tests were performed in the upper and lower aquifers and in the silt and clay between these layers. The slug tests determined the average hydraulic conductivity in the perched unit to be 8.5E-4 to2.2E-2 cm/sec. Average K values for the aquitard obtained from slug tests are approximately 4.6E-5 cm/sec. Additional K values for the aquitard, which were obtained utilizing the "falling head permeability test with back pressure," are between 3.0E-8 and 8.0E-9 cm/sec. Average K values for the regional aquifer are approximately 8.0E-4 cm/sec. Additional tests suggest that K is as great as 1.0E-2 cm/sec. The facility concludes that 1.0E-2 cm/sec is a reasonable value for both the Upper and Lower Regional Aquifers.

Perched Shallow Aquifer

Interbedded sand lenses in the recent alluvium allow for the presence of a perched water table at the site. The perched sand aquifer extends from 5 to 20 feet below grade with a maximum thickness of 15 feet and is bounded above and below by the clay and silty clay. Chemetco states that groundwater flow direction in the perched "shallow"aquifer is primarily from north to south. Historic flow maps have shown an eastern component of flow also.

Chemetco has numerous monitoring wells located throughout their property. In the March and April of 2001, Ms. Search sampled and analyzed groundwater from three of these monitoring wells. The results of these samples were compared to Illinois EPA groundwater standards (35 IAC 620 Groundwater Standards). Samples from the wells were found to exceed the standards for boron, cadmium, fluoride, lead and manganese. To see the complete report and analytical results for this groundwater sampling event refer to the following report:

L1198010003 – Madison County
Hartford/Chemetco
RCRA Groundwater Operation and Maintenance Inspection

Four towns within four miles of Chemetco utilize groundwater for their municipal water supplies. These towns are Roxana, Hartford, Edwardsville and Wood River (see Figure 5 for the locations of these wells). All of their wells obtain water from around 100 feet in depth from a sand and gravel aquifer. According to the Illinois EPA 2001 Annual Compliance Report, which tells whether public wells are in compliance with drinking water Maximum Contaminant Levels (MCL), none of the wells exceed MCLs for any contaminants that would be associated with the Chemetco site.

Several of the rural residences in the vicinity of Chemetco also utilize private wells for their water supply. Four of these residential wells were sampled to help determine whether activities at Chemetco have impacted their water supply. These wells ranged from forty to fifty feet in depth. The locations of the residential wells that were samples can be seen on Figure 4.

The analytical results from the residential wells were compared to current US EPA drinking water standards. The drinking water standards that are used for comparison values are called Maximum Contaminant Levels, or MCLs. MCLs are the highest levels of a contaminant that is allowed in drinking water for public water systems. Although the residential wells that were sampled are not considered public water systems, the MCLs can still be used as a health-based comparison value. When compared to the MCLs, none of the residential wells were found to contain any contaminants exceeding these levels.

5.3 SURFACE WATER PATHWAY

Surface water runoff from Chemetco flows into a tributary of Long Lake which is located just south of the facility (see Figure 6). This tributary flows east for approximately one-half mile and then turns to the south where it becomes Long Lake. As its name indicates, Long Lake looks more like a creek than a lake as it is very long and narrow. At the time of the sampling event in April of 2002, the lake was very shallow with most areas being less than two feet in depth. A portion of Long Lake is located alongside a residential neighborhood (see Figure 6). Some people in this neighborhood indicated that they utilize the lake for recreational fishing. In addition, forested and emergent wetlands are located adjacent to the tributary of Long Lake and Long Lake along the majority of their shorelines downstream of Chemetco. At the southern end of Long Lake, the water flows to the west into Stanley Ditch which flows in a southwesterly direction until it enters the Chain of Rocks Canal. The Chain of Rocks Canal flows south for approximately five miles and then enters the main water body of the Mississippi River. See Figure 6 for a surface water pathway map.

Ten sediment samples were collected from Long Lake in April of 2002 to help determine whether contaminants have migrated from the Chemetco site into the lake. These were all collected within the top six inches of the soft sediment bottom of the lake and analyzed for inorganics. The locations of the sediment samples can be seen on Figure 4.

The analytical results from the sediment samples were compared to ecotoxilogical benchmarks to help determine whether Long Lake has been impacted by Chemetco. The source of benchmarks for this comparison were the Ontario sediment quality guidelines. Ontario sediment quality guidelines are non-regulatory ecological benchmark values that serve as indicators of potential aquatic impacts. Levels of contaminants below Ontario benchmarks indicate a level of pollution which has no effect on the majority of the sediment-dwelling organisms. The analytical results from the sediment samples are compared to these benchmarks on Table 2. The samples exceeding both the ecotoxilogical benchmarks as well as containing levels of contaminants over three times background levels (X201 was collected upstream of Chemetco and used as a background comparison) are printed in red ink.

As can be seen on Table 2, the sediment samples collected from the tributary of Long Lake and Long Lake exceed both ecotoxilogical benchmarks and meet observed release criteria according to the Hazard Ranking System (HRS) for cadmium, copper, lead and nickel. These are all metals which were present at significantly elevated levels in the zinc oxide slurry which Chemetco illegally discharged into Long Lake (see Section for a discussion of the zinc oxide discharge). Thus, the elevated levels of these metals can be attributed to the Chemetco site. The documented portion of Long Lake that has been impacted extends to the furthest downstream sediment sample that was found to be contaminated which is sample X210 (see Figure 4).

5.4 AIR PATHWAY

The potential for windblown particulates to carry contamination off-site exists. The Chemetco facility is not vegetated and contains exposed slag and zinc oxide piles which contain high levels of metals. On dry, windy days small particles are blown off of these piles and could potentially be blown onto nearby residential properties. However, there are very few residences in the immediate vicinity of Chemetco and the soil samples collected from these yards during the April, 2002 sampling event did not show levels of contamination exceeding health-based benchmarks.

A group of people who could be potentially exposed to elevated levels of airborne contaminants are the onsite workers. The levels of lead found in the slag pile range from around 7,000 to 16,000 parts per million and in the zinc oxide pile lead was found at concentrations of up to 152.000 parts per million. These greatly exceed health-based benchmarks for lead which are 400 parts per million. When particulates from these materials blow around the site the workers could potentially inhale or ingest them. Because of this, measures should be taken to reduce the occurance of the contaminants from becoming airborne and during times when the contaminants are airborne the workers should wear respiratory protection to reduce their intake of contaminants. This has been discussed with Dr. Ron Yarbrough and he stated that safety measures are being taken by on-site workers to reduce their potential exposure to contaminants.

5.5 SOIL EXPOSURE

For many years of its operations, Chemetco discharged metals out of its smelting furnace smoke stacks without adequate air pollution emission controls. In addition, the slag on-site blows around on dry, windy days and could migrate off site to residential areas. During the 2002 CERCLA sampling event, the Illinois EPA sampled the soils in six yards in the vicinity of Chemetco and analyzed these for inorganics. Houses were selected in all directions of the facility to help determine whether past activities at Chemetco had impacted nearby residences. In addition, samples X107 and X108 were collected to help determine whether flooding of Long Lake had deposited contaminants onto the yards alongside Long Lake. The locations of the residential soil samples can be seen on Figure 4.

The analytical results of the residential soil samples were compared to Illinois EPA's TACO human health-based remediation objectives for residential properties and are shown in Table 3. When compared to these remediation objectives, none of the soil samples collected from the residential yards were found to contain any contaminants exceeding these objectives.

Appendix A
Figures

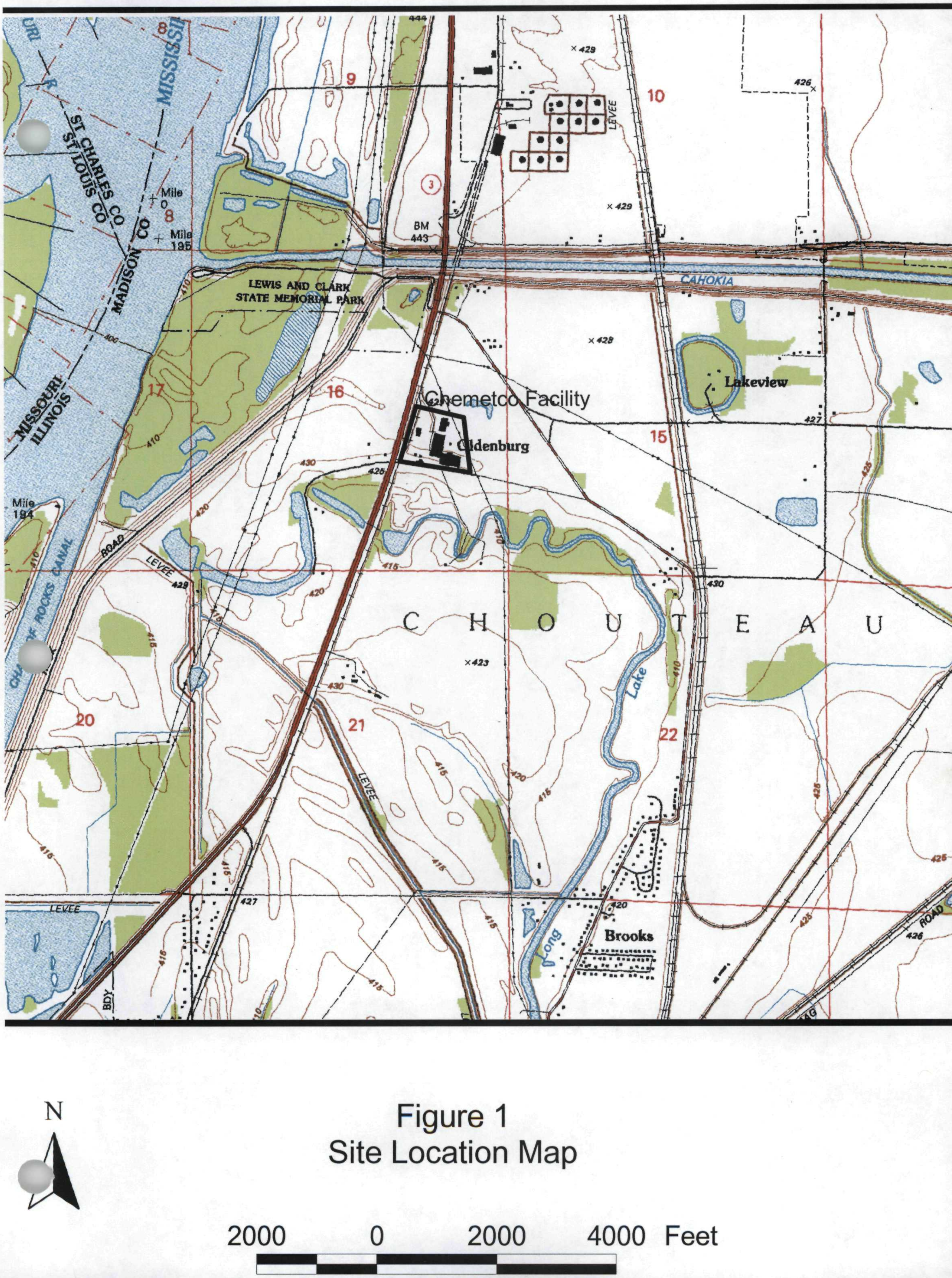

Figure 1
Site Location Map

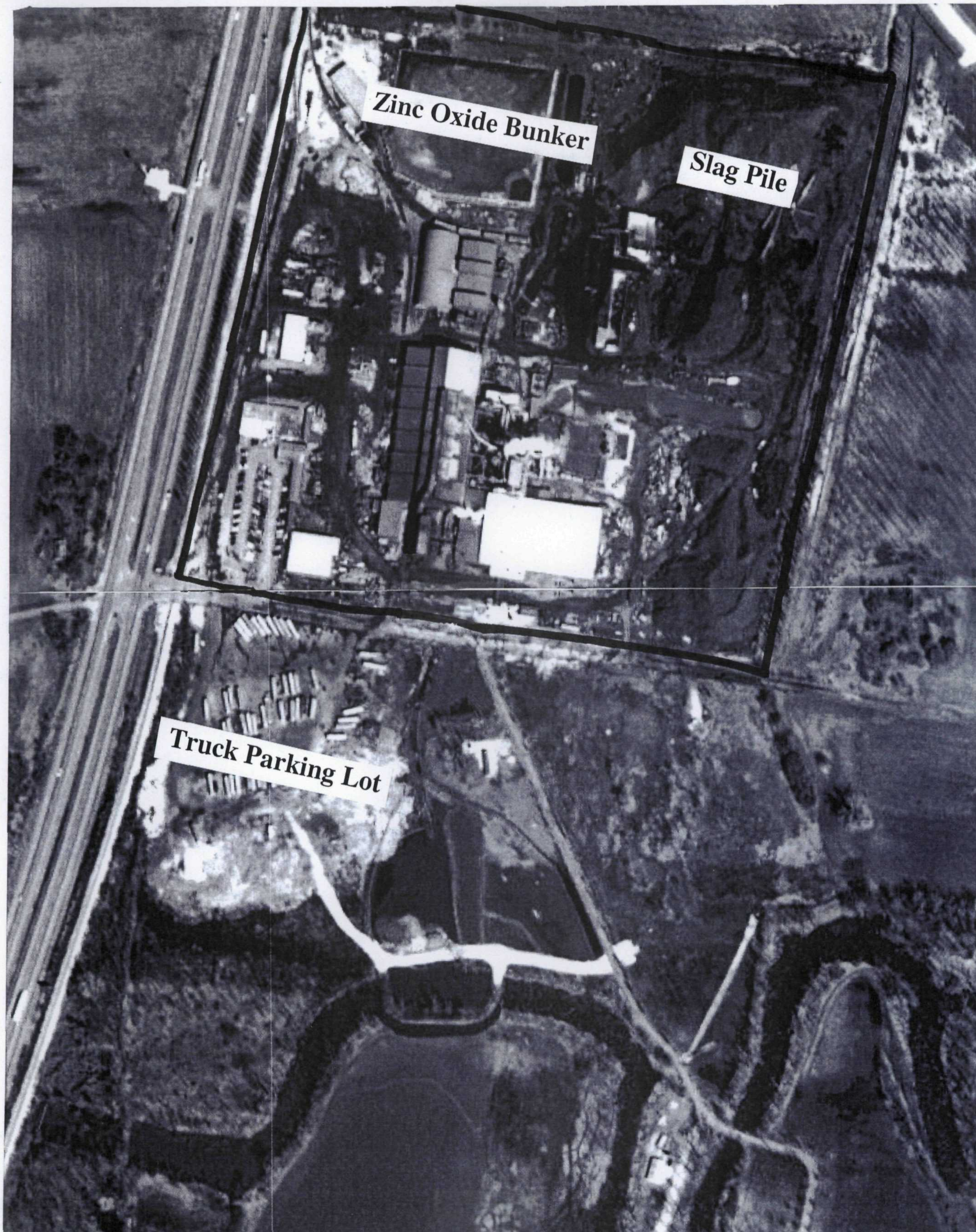

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Figure 2
1998 Aerial Photgraph

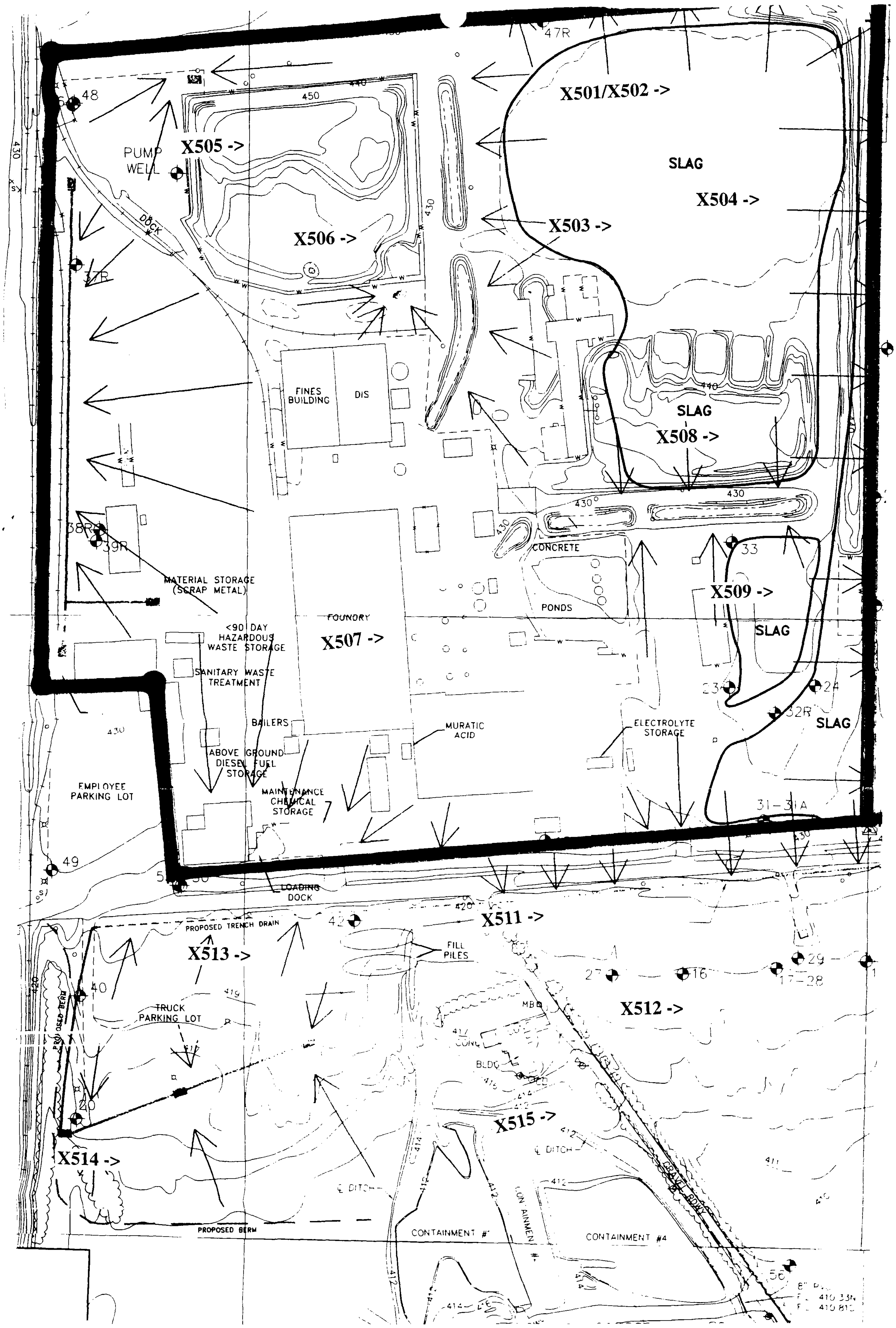


Figure 3

Site Map and On-Site Sample Locations

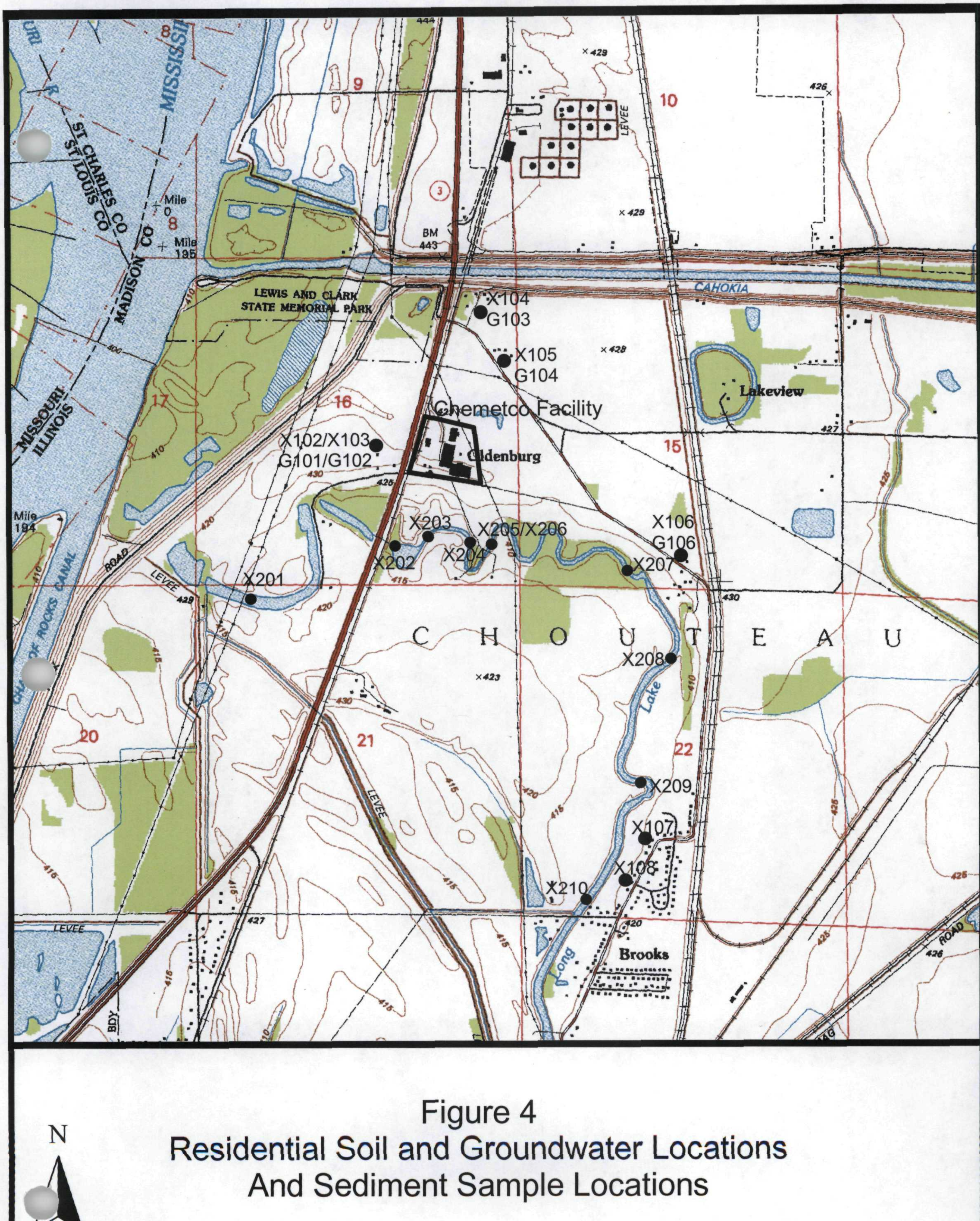


Figure 4
Residential Soil and Groundwater Locations
And Sediment Sample Locations

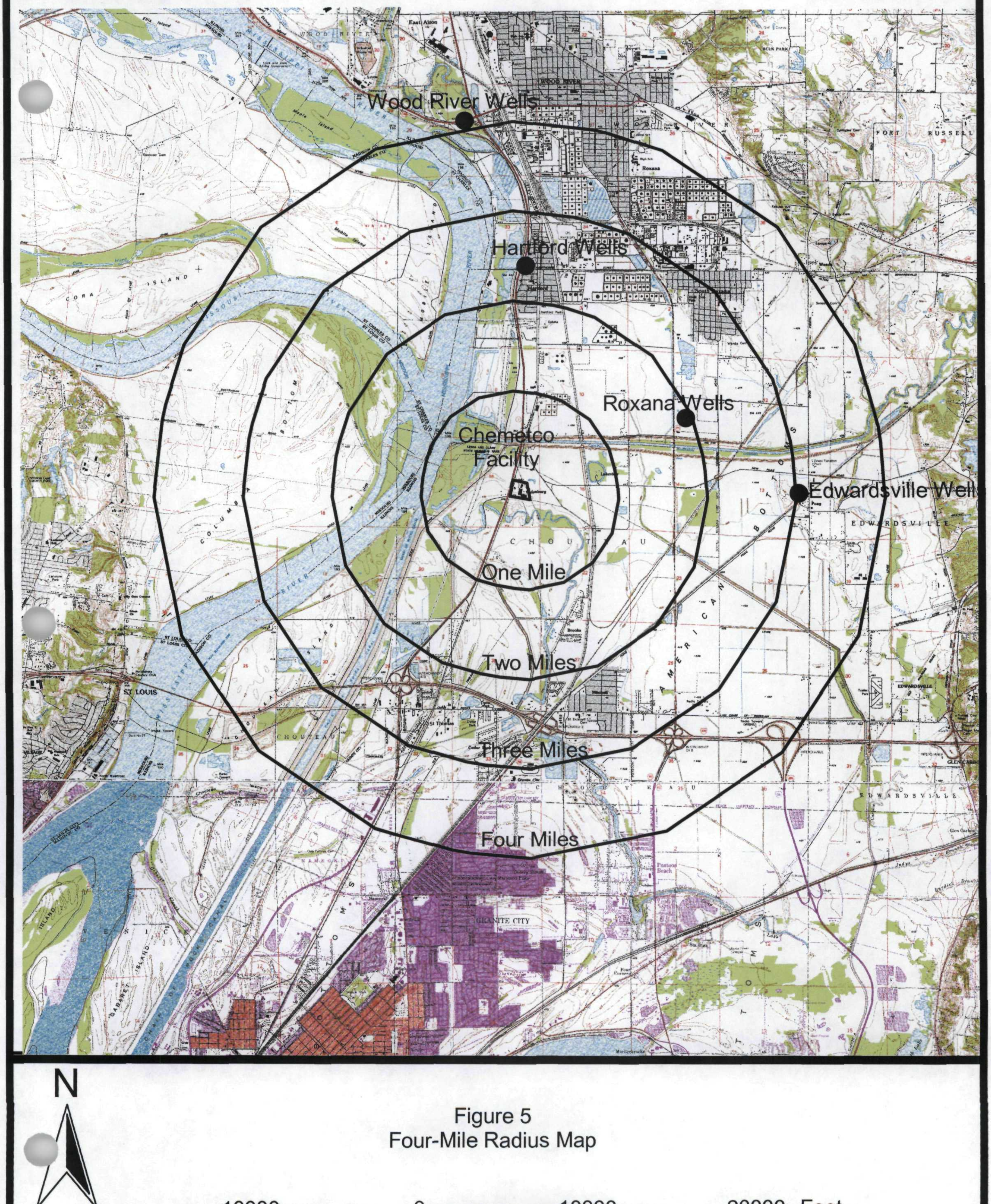


Figure 5
Four-Mile Radius Map

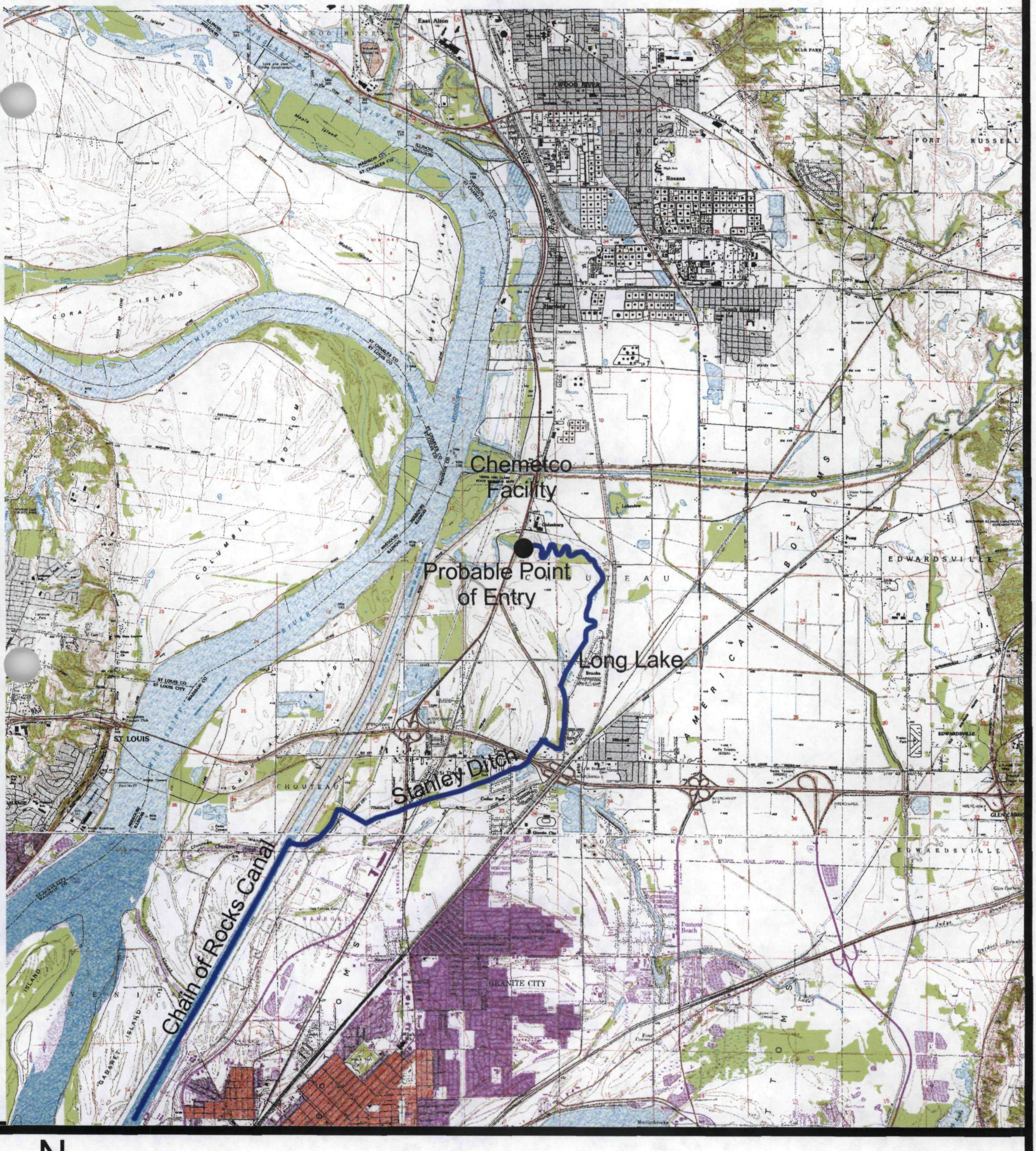


Figure 6
Surface Water Pathway Map

10000 0 10000 20000 Feet

Appendix B
Tables

Table 1
Chemetco Facility Soil/Waste Sample Analytical Results

	X101 background	X501	X502	X503	X504	X505	X506	X507	X508	X509	X511	X512	X513	X514	X515
ALUMINUM	6860	16100	14900	15600	16500	8920	9040	3300	9090	5110	8670	6880	8410	5760	16900
ANTIMONY	1.3 UJ	1 R	1 R	0.99 R	0.96 R	4.6 J	578 J	1450 J	0.99 R	1.1 R	3.8 J	1.5 J	0.99 R	38.6 J	1.1 R
ARSENIC	4.8	2.7 J	2.2 J	1.6 J	0.77 UJ	188 J	242 J	110 J	4.6 J	6.9 J	11.6	11.8	14 J	14.4 J	7.1 J
BARIUM	107	983	906	905	1040	777	993	403	403	390	275	221	539	439	395
BERYLLIUM	0.44	57.3 J	54.1 J	90.9 J	110 J	39 J	25.2 J	5 J	60.4 J	33.1 J	1.3	1.2	18.9 J	11.8 J	38.9 J
CADMIUM	0.37	62.7 J	66.1 J	7.9 J	3.8 J	793 J	2970 J	180 J	18.6 J	23.4 J	11.3	4.9	63.6 J	134 J	63.9 J
CALCIUM	6770	11300	10600	9440	9430	15700	16500	4440	13400	11700	3990	3240	59500	50700	51700
CHROMIUM	11.6	122	99.6	170	188	54.5	64.8	27.6	136	62.1	13.3	10.2	57.4	36.3	85.6
COBALT	6.9	200	186	203	142	70.1	45	31.4	132	116	12.4	18	42.1	37.6	84.1
COPPER	13.3	8610 J	6160 J	5900 J	3870 J	27900	97700 J	192000 J	5450 J	6630 J	1780	1750	28500	31800	6740 J
IRON	13200	273000	256000	264000	247000	68900	22000	31900	196000	152000	13200	12600	74900	51000	140000
LEAD	18.3 J	16300	15400	9810 J	7800 J	29400	152000	116000 J	6790 J	7940 J	454 J	486 J	6220 J	M	11400 J
MAGNESIUM	3440	4630	3570	3660	3540	4780	2600	1010	6550	4220	3790	2340	4850	5850	10500
MANGANESE	741 J	2880 J	2740 J	2330 J	2490 J	1480	821	466	2140 J	1960	861 J	969 J	1010	790	2140
MERCURY	0.07 U	0.05 U	0.05 U	0.05 U	0.05 U	2.7	26.6	0.35	0.06	0.11	0.08	0.07	0.43	0.29	0.13
NICKEL	14.9	846	690	609	410	966	5000 J	5820 J	451	587	952	598	693	298	793
POTASSIUM	920	1280	1270	1120	1130	863	548	310	787	955	1260	1140	1080	797	1610
SELENIUM	1.3 U	1 U	1 U	0.99 U	0.96 U	12.8 J	32.6 J	3.4 J	0.99 U	2.3 J	1.3 U	1.2 U	1.5 J	1.1 U	1.4 J
SILVER	0.26 U	0.2 UJ	0.2 UJ	0.2 UJ	0.19 UJ	17.7 J	62.1 J	49.5 J	0.2 UJ	0.21 UJ	1.2	0.23 U	3.2 J	20.8 J	0.21 UJ
SODIUM	356 J	7060 J	6970 J	6660 J	5830 J	1200	8880 J	2950 J	3030 J	2390 J	5280 J	365 J	1660	1430	2180 J
THALLIUM	1.6	8.7	7.1	10.5	11.9	1.1 U	3.8	0.96 U	11.2	13.5	1.5	1.2 U	2.4	1.7	5.4
VANADIUM	17.7	12.5	10.7	13.2	15.1	18.7	15	2.4	9	4	22.4	22.9	14.2	13.5	33.1
ZINC	65	78500	72900	73100	71000	79100	217000 J	17200	62000	63200	1320	642	26400	26800	34500
CYANIDE	0.26	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ	0.24 J	0.21 UJ	1.3 J	0.1 UJ	0.11 UJ	0.29	0.33	0.49 J	0.87 J	0.52 J

All results shown in parts per million.
Numbers shown in red exceed three-times background levels.

Table 2
Sediment Sample Analytical Results

	Ecotoxilogical Benchmark	X201 background		X202		X203		X204		X205		X206		X207		X208		X209		X210	
ALUMINUM		7380		11400		18900		11500		12700		14500		13300		11500		9430		10200	
ANTIMONY		1.7	UJ	3.3	J	2	UJ	1.7	UJ	1.9	J	2	UJ	2	UJ	2.2	UJ	2.6	UJ	2.9	UJ
ARSENIC	6	6.8		7		6.4		5.3		4.8		6		7.4		7.8		6		6.9	
BARIUM		245		226		235		270		253		246		232		205		238		240	
BERYLLIUM		0.64		1.2		1.2		0.92		1.1		1.2		1.1		0.78		0.75		0.73	
CADMIUM	0.6	0.75		10.4		77.4		8.1		57.3		32.9		34.8		23.6		35.1		25.6	
CALCIUM		4120		6830		6380		5720		6760		6810		8230		5500		6470		8440	
CHROMIUM		11		16.5		24.8		15.8		18.1		19.7		18		15.9		13.1		14.3	
COBALT	50	3.6		8.9		8.1		6		5.6		5.4		6.3		5		7.8		7.8	
COPPER	16	26.6		849		92.6		35.7		378		259		163		235		148		105	
IRON	20000	12900		17700		21200		15300		15300		16300		14900		15600		16800		17500	
LEAD	31	49.7	J	403	J	72.4	J	41.6	J	180	J	143	J	83.4	J	101	J	68.7	J	58.2	J
MAGNESIUM		2380		3660		4730		3450		3940		4010		3950		3200		3350		4310	
MANGANESE	460	201	J	367	J	269	J	228	J	202	J	194	J	199	J	186	J	449	J	498	J
MERCURY	0.2	0.08	U	0.12		0.1	U	0.07	U	0.13		0.13		0.1	U	0.1		0.11	U	0.11	U
NICKEL	16	12.1		41.8		199		42.3		108		101		97.2		55.3		96.5		58.1	
POTASSIUM		1770		2210		3850		2320		2870		3080		2500		2000		1950		2160	
SELENIUM		1.7	U	1.7	U	2	U	1.9		3		2.7		2	U	2.3		2.6	U	2.9	U
SILVER	0.5	0.33	U	0.34	U	0.39	U	0.33	U	0.38	U	0.4	U	0.39	U	0.44	U	0.51	U	0.57	U
SODIUM		545	J	950	J	3210	J	1590	J	1680	J	1810	J	987	J	1030	J	1000	J	1080	J
THALLIUM		1.7	U	2.1		3.1		2		2.3		3.4		2	U	2.8		3.8		3.8	
VANADIUM		20.2		27.2		38.9		26.9		28.8		31.2		30.9		28		23.8		25.2	
ZINC	120	109		1380		1190		235		679		578		442		268		476		380	
CYANIDE	0.1	0.16	U	0.17	U	0.19	U	0.17	U	0.18	U	0.22		0.19	U	0.38		0.26	U	0.27	U

All results shown in parts per million.
Results shown in red exceed both the ecotoxilogical benchmark and three times background levels.

Table 3
Residential Soil Sample Analytical Results

	TACO Benchmark	X101 background		X102		X103		X104		X105		X106		X107		X108	
ALUMINUM		6860		6420		5510		10200		5890		7230		9110		9850	
ANTIMONY	31	1.3	UJ	1.2	UJ	1.2	UJ	1.3	UJ	1.3	UJ	1.2	UJ	1.3	UJ	1.2	UJ
ARSENIC	13	4.8		6.9		6.1		6.9		6.3		13.1		6.6		10.5	
BARIUM	5500	107		163		143		170		169		216		167		178	
BERYLLIUM	160	0.44		0.62		0.51		0.74		0.59		0.54		0.6		0.8	
CADMIUM	78	0.37		1.6		1.5		0.64		1.7		1.4		0.84		0.71	
CALCIUM		6770		7490		4760		4920		3320		3740		5110		14100	
CHROMIUM	230	11.6		9.9		8.3		12.8		9.9		11.8		12.7		13.9	
COBALT	4700	6.9		6.5		5.7		7.6		7.1		8.1		6.5		7.5	
COPPER	2900	13.3		244		204		77.4		225		72.9		42.5		25.7	
IRON		13200		11900		10400		15800		10300		11500		13100		16200	
LEAD	400	18.3	J	158	J	122	J	43.2	J	111	J	83.6	J	44.8	J	25.7	J
MAGNESIUM		3440		3880		2370		3220		1870		2240		2840		7000	
MANGANESE	3700	741	J	417	J	354	J	421	J	647	J	915	J	435	J	568	J
MERCURY	10	0.07	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
NICKEL	1600	14.9		24		21.5		19.4		18.2		18.9		17.6		21.4	
POTASSIUM		920		1890		1730		1660		1530		2330		1820		1990	
SELENIUM	390	1.3	U	1.2	U	1.2	U	1.3	U	1.3	U	1.2	U	1.3	U	1.2	U
SILVER	390	0.26	U	0.25	U	0.24	U	0.25	U	0.26	U	0.24	U	0.26	U	0.25	U
SODIUM		356	J	329	J	323	J	362	J	361	J	655	J	374	J	358	J
THALLIUM	6.3	1.6		1.6		1.6		2.5		1.8		1.2	U	1.3	U	1.2	U
VANADIUM	550	17.7		17.1		15.1		18.5		16.9		21.4		23.5		23.7	
ZINC	23000	65		319		252		191		351		164		112		84.2	
CYANIDE	1600	0.26		0.12	U	0.12	U	0.12		0.13	U	0.19		0.2		0.12	U

All results shown in parts per million.
Results shown in red exceed TACO Residential Soil Remediation Objectives.

Table 4
Residential Groundwater Sample Analytical Results

	US EPA MCLs	G101		G102		G103		G104		G105 Field Blank		G106		G107 Trip Blank	
Volatiles															
cis-1,2-Dichloroethene	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	3		0.5	U
Benzene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.2	J	0.5	U
Trichloroethene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	5		0.5	U
Bromoform	1	0.9	VS	0.5	UJ	0.5	UJ	0.5	UJ	1	VS	0.5	UJ	0.9	VS
No Semi-Volatiles, Pesticides or PCBs detected.															
Inorganics															
ALUMINUM		67.7		62		84.3		106		44	U	64.5			
ANTIMONY	6	4	U	4	U	4	U	4	U	4	U	4	U		
ARSENIC	50	5.9		6.1		5.1		1.3	M	2	U	0.5	M		
BARIUM	2000	109		107		530		267		0.7	M	664			
BERYLLIUM	4	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U		
CADMIUM	5	0.3	U	0.3	U	0.6	U	0.3	U	0.3	U	0.9	U		
CALCIUM		69100		69800		134000		155000		60.1	M	98600			
CHROMIUM	100	1		1.3		0.9	U	0.9	U	0.9	U	0.9	U		
COBALT		4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U		
COPPER	650	11.4		11.3		6.6		1.5	M	4.4	U	4.4	U		
IRON		75.1		101		3290		1550		16.5	M	14000			
LEAD	7.5	2	U	2	U	0.6	M	2	U	2	U	0.7	M		
MAGNESIUM		13400		13200		29800		39600		13.5		23800			
MANGANESE		13.9		14.2		304		173		8.6	U	613			
MERCURY	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U		
NICKEL	100	1.7	M	1.4	M	1.7	M	3.6		1.1	M	1.3	M		
POTASSIUM		2360		2350		5670		5480		482	U	3650			
SELENIUM	50	8	U	8	U	8	U	12	U	4	U	8	U		
SILVER	50	1.7	U	1.7	U	1.7	M	1.7	U	1.7	U	1.7	U		
SODIUM		6970		6820		22500		38000		156	M	13300			
THALLIUM	2	2	U	2	U	6	U	4	U	2	U	4	U		
VANADIUM	49	17	U	17	U	17	U	17	U	17	U	17	U		
ZINC	5000	20	M	19.1	M	32.9		25.9	M	36	U	439			
CYANIDE	200	8	U	8	U	8	U	8	U	8	U	8	U		

Appendix C
Target Compound List

TARGET COMPOUND LIST

Volatile Target Compounds

Chloromethane	1,2-Dichloropropane
Bromomethane	cis-1,3-Dichloropropene
Vinyl Chlorde	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride	1,1,2-Trichloroethane
Acetone	Benzene
Carbon Disulfide	trans-1,3-Dichloropropene
1,1-Dichloroethene	Bromoform
1,1-Dichloroethane	4-Methyl-2-pentanone
1,2-Dichloroehtene (total)	2-Hexanone
Chloroform	Tetrachloroethene
1,2-Dichloroethane	1,1,2,2-Tetrachloroethane
2-Butanone	Toluene
1,1,1-Trichloroethane	Chlorobenzene
Carbon Tetrachloride	Ethylbenzene
Vinyl Acetate	Styrene
Bromodichloromethane	Xylenes (total)

Base/Neutral Target Compounds

Hexachloroethane	2,4-Dinitrotoluene
bis(2-Chloroethyl) Ether	Diethylphthalate
Benzyl Alcohol	N-Nitrosodiphenylamine
bis (2-Chloroisopropyl) Ether	Hexachlorobenzene
N-Nitroso-Di-n-Propylamine	Phenanthrene
Nitrobenzene	4-Bromophenyl-phenylether
Hexachlorobutadiene	Anthracene
2-Methylnaphthalene	Di-n-Butylphthalate

1,2,4-Trichlorobenzene	Fluoranthene
Isophorone	Pyrene
Naphthalene	Butylbenzylphthalate
4-Chloroaniline	bis(2-Ethylhexyl)Phthalate
bis(2-chloroethoxy)Methane	Chrysene
Hexachlorocyclopentadiene	Benzo(a)Anthracene
2-Chloronaphthalene	3-3'-Dichlorobenzidene
2-Nitroaniline	Di-n-Octyl Phthalate
Acenaphthylene	Benzo(b)Fluoranthene
3-Nitroaniline	Benzo(k)Fluoranthene
Acenaphthene	Benzo(a)Pyrene
Dibenzofuran	Ideno(1,2,3-cd)Pyrene
Dimethyl Phthalate	Dibenz(a,h)Anthracene
2,6-Dinitrotoluene	Benzo(g,h,i)Perylene
Fluorene	1,2-Dichlorobenzene
4-Nitroaniline	1,3-Dichlorobenzene
4-Chlorophenyl-phenylether	1,4-Dichlorobenzene

Acid Target Compounds

Benzoic Acid	2,4,6-Trichlorophenol
Phenol	2,4,5-Trichlorophenol
2-Chlorophenol	4-Chloro-3-methylphenol
2-Nitrophenol	2,4-Dinitrophenol
2-Methylphenol	2-Methyl-4,6-dinitrophenol
2,4-Dimethylphenol	Pentachlorophenol
4-Methylphenol	4-Nitrophenol
2,4-Dichlorophenol	

Pesticide/PCB Target Compounds

alpha-BHC	Endrin Ketone
beta-BHC	Endosulfan Sulfate
delta-BHC	Methoxychlor
gamma-BHC (Lindane)	alpha-Chlordane
Heptachlor	gamma-Chlordane
Aldrin	Toxaphene
Heptachlor epoxide	Aroclor-1016
Endosulfan I	Aroclor-1221
4,4'-DDE	Aroclor-1232
Dieldrin	Aroclor-1242
Endrin	Aroclor-1248
4,4'-DDD	Aroclor-1254
Endosulfan II	Aroclor-1260
4,4'-DDT	

Inorganic Target Compounds

Aluminum	Manganese
Antimony	Mercury
Arsenic	Nickel
Barium	Potassium
Beryllium	Selenium
Cadmium	Silver
Calcium	Sodium
Chromium	Thallium
Cobolt	Vanadium
Copper	Zinc
Iron	Cyanide
Lead	Sulfide
Magnesium	

Appendix D
Sampling Photographs

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	COUNTY: Madison

DATE: April 15, 2002
TIME: 1600
PHOTO BY: Peter Sorensen
SAMPLE: X207
COMMENTS:

DATE: April 15, 2002
TIME: 1540
PHOTO BY: Peter Sorensen
SAMPLE: X208
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	COUNTY: Madison

DATE: April 15, 2002
TIME: 1520
PHOTO BY: Peter Sorensen
SAMPLE: X209
COMMENTS:

DATE: April 15, 2002
TIME: 1500
PHOTO BY: Peter Sorensen
SAMPLE: X210
COMMENTS:

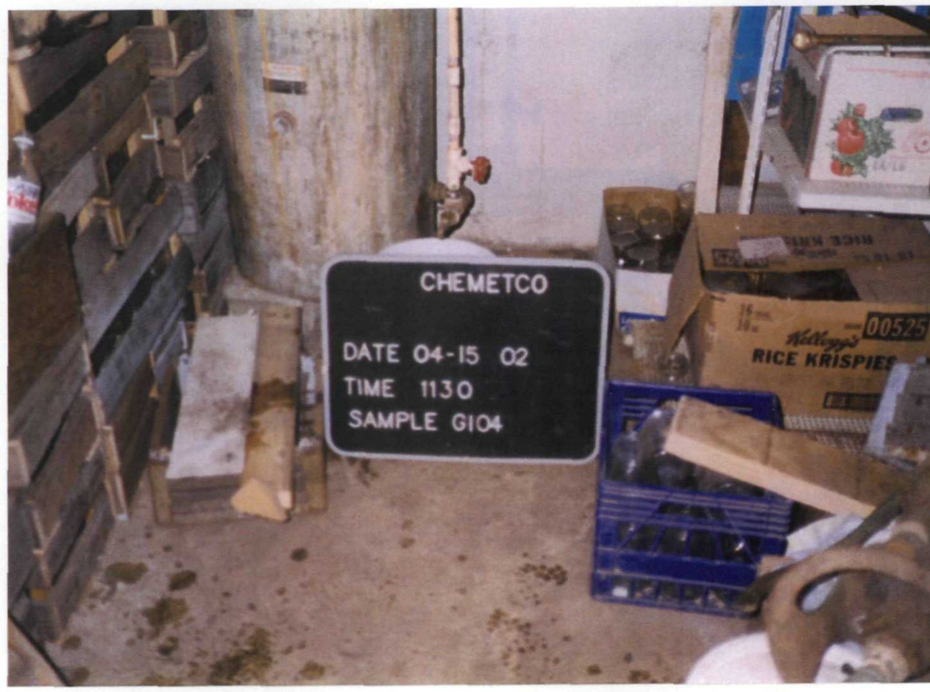
SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	**COUNTY:** Madison

DATE: April 15 , 2002
TIME: 0930
PHOTO BY: Peter Sorensen
SAMPLE: G101 and G102
COMMENTS:

DATE: April 15, 2002
TIME: 1045
PHOTO BY: Peter Sorensen
SAMPLE: G103
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	COUNTY: Madison

DATE: April 15, 2002
TIME: 1130
PHOTO BY: Peter Sorensen
SAMPLE: G104
COMMENTS:



DATE: April 15, 2002
TIME: 1130
PHOTO BY: Peter Sorensen
SAMPLE: G104
COMMENTS:

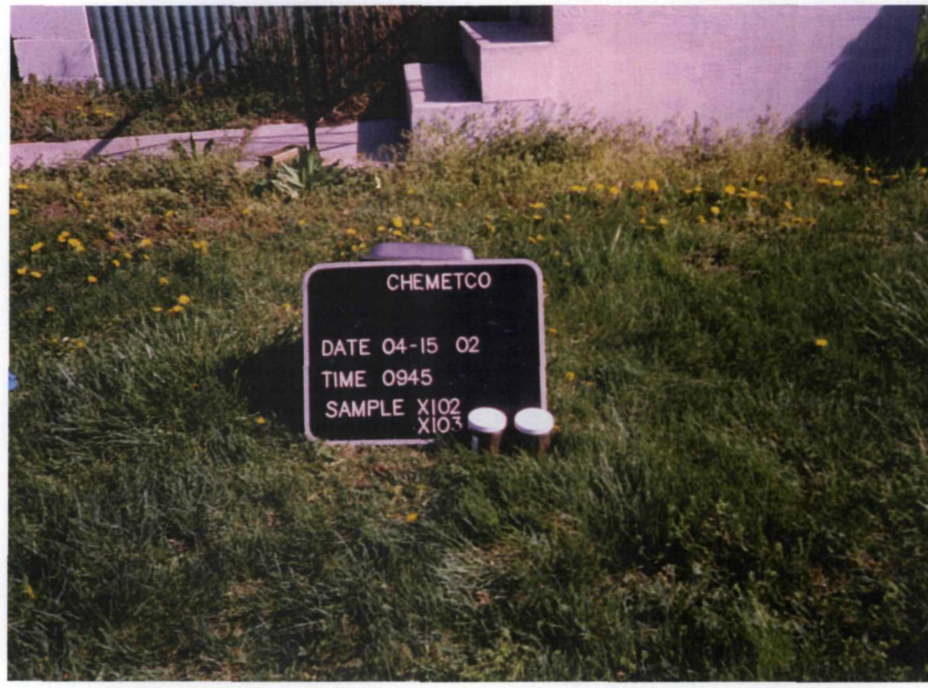
SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	**COUNTY:** Madison

DATE: April 15, 2002
TIME: 1230
PHOTO BY: Peter Sorensen
SAMPLE: G106
COMMENTS:

DATE: April 16, 2002
TIME: 1100
PHOTO BY: Peter Sorensen
SAMPLE: X101
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	COUNTY: Madison

DATE: April 15, 2002
TIME: 0945
PHOTO BY: Peter Sorensen
SAMPLE: X102 and X103
COMMENTS:



DATE: April 15, 2002
TIME: 1100
PHOTO BY: Peter Sorensen
SAMPLE: X104
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	COUNTY: Madison

DATE: April 15, 2002
TIME: 1135
PHOTO BY: Peter Sorensen
SAMPLE: X105
COMMENTS:

DATE: April 15, 2002
TIME: 1240
PHOTO BY: Peter Sorensen
SAMPLE: X106
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	COUNTY: Madison

DATE: April 15, 2002
TIME: 1250
PHOTO BY: Peter Sorensen
SAMPLE: X107
COMMENTS:

DATE: April 15, 2002
TIME: 1315
PHOTO BY: Peter Sorensen
SAMPLE: X108
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	**COUNTY:** Madison

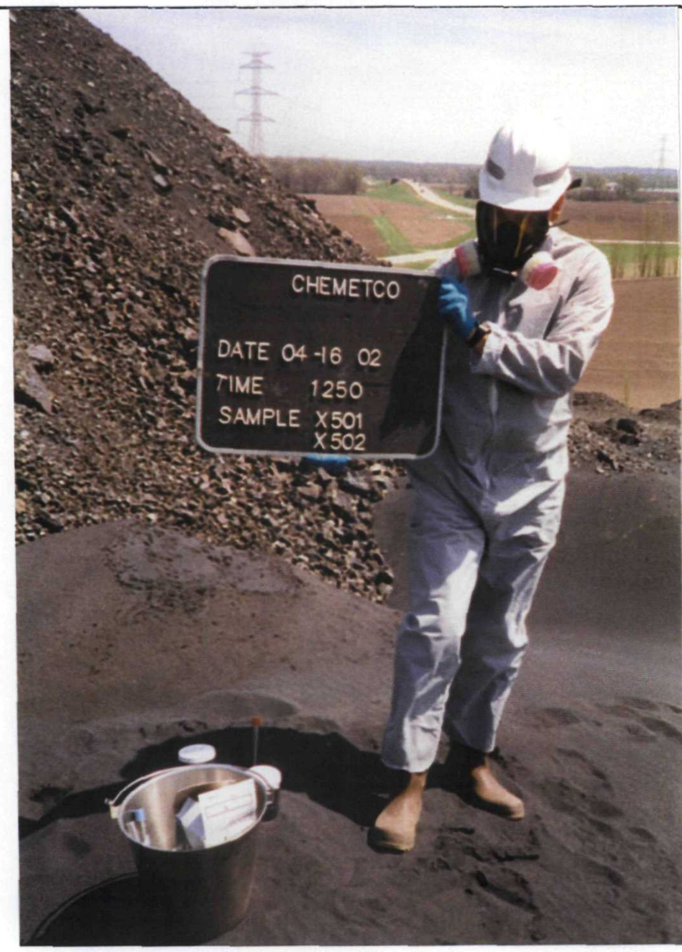
DATE: April 16, 2002

TIME: 1250

PHOTO BY: Peter Sorensen

SAMPLE: X501 and X502

COMMENTS:



DATE: April 16, 2002

TIME: 1240

PHOTO BY: Peter Sorensen

SAMPLE: X503

COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	COUNTY: Madison

DATE: April 16, 2002
TIME: 1300
PHOTO BY: Peter Sorensen
SAMPLE: X504
COMMENTS:

DATE: April 16, 2002
TIME: 1320
PHOTO BY: Peter Sorensen
SAMPLE: X505
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	**COUNTY:** Madison

DATE: April 16, 2002
TIME: 1330
PHOTO BY: Peter Sorensen
SAMPLE: X506
COMMENTS:

DATE: April 16, 2002
TIME: 1340
PHOTO BY: Peter Sorensen
SAMPLE: X507
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	COUNTY: Madison

DATE: April 16, 2002
TIME: 1350
PHOTO BY: Peter Sorensen
SAMPLE: X508
COMMENTS:

DATE: April 16, 2002
TIME: 1355
PHOTO BY: Peter Sorensen
SAMPLE: X509
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	**COUNTY:** Madison

DATE: April 16, 2002
TIME: 1200
PHOTO BY: Peter Sorensen
SAMPLE: X511
COMMENTS:

DATE: April 16, 2002
TIME: 1210
PHOTO BY: Peter Sorensen
SAMPLE: X512
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	**COUNTY:** Madison

DATE: April 16, 2002
TIME: 1150
PHOTO BY: Peter Sorensen
SAMPLE: X513
COMMENTS:

DATE: April 16, 2002
TIME: 1130
PHOTO BY: Peter Sorensen
SAMPLE: X514
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	**COUNTY:** Madison

DATE: April 16, 2002
TIME: 1340
PHOTO BY: Peter Sorensen
SAMPLE: X515
COMMENTS:

DATE: April 16, 2002
TIME: 1010
PHOTO BY: Peter Sorensen
SAMPLE: X201
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	COUNTY: Madison

DATE: April 16, 2002
TIME: 0950
PHOTO BY: Peter Sorensen
SAMPLE: X202
COMMENTS:

DATE: April 16, 2002
TIME: 0940
PHOTO BY: Peter Sorensen
SAMPLE: X203
COMMENTS:

SITE NAME: Chemetco	
CERCLIS ID: ILD 048 843 809	COUNTY: Madison

DATE: April 16, 2002
TIME: 0920
PHOTO BY: Peter Sorensen
SAMPLE: X204
COMMENTS:

DATE: April 16, 2002
TIME: 0900
PHOTO BY: Peter Sorensen
SAMPLE: X205 and X206
COMMENTS: